

Roughness-induced anchoring transitions in nematic liquid crystals

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In this talk we revisit the problem of a nematic liquid crystal in contact with rough substrates. The substrate is modelled as a periodic array of parallel infinite grooves of well-defined cross section sculpted on a chemically homogeneous substrate which favors locally a homeotropic anchoring for the nematic. We consider three cases: a sawtooth substrate, a crenellated substrate and a sinusoidal substrate. We analyse this problem within the Frank-Oseen formalism. We argue that, for substrate periodicities much larger than the nematic coherence length, the existence of different nematic textures with different far-field orientations, as well as the anchoring transitions between them, is associated to the presence of topological defects either on or close to the rough substrate. We discuss the possible consequences of this observation on interfacial phenomena such as wetting and filling transitions.